

**PATENT APPLICATION**

Docket No. 4515/84415

**METHOD OF COILING DISPOSABLE HANDCUFFS AND  
APPARATUS THEREFOR**

**FIELD OF THE INVENTION**

The present invention relates to disposable police restraints (handcuffs), of both the single loop variety and the double loop variety. Specifically, the present invention is directed to a method and apparatus for coiling such cuffs, which are normally carried in their open configuration, or in a partially closed loop, into a small, easy to carry, and easy to use, coiled cuff form. Other embodiments of the present invention are the coiled disposable cuffs themselves, both in the single loop form and the double loop form.

**BACKGROUND OF THE INVENTION**

Temporary police restraints are those which are used once and disposed of after use. The restraint is usually flexible made of a material such as nylon with a permanent locking head. It is cut to be released. Temporary restraints have been used for many years and in many forms, either as a single loop restraint and in recent years as a double loop restraint. See for example U.S. Patent Nos. 4,910,831, 5,159,728 and 5,398,383, the disclosures of which are hereby incorporated herein by reference.

Single loop cuffs are typically made from an elongated, substantially flat strap having a toothed socket clasp located at one end. Double loop cuffs are typically made from two elongated, substantially flat straps having a toothed socket clasp located at the midpoint. The cuffs are used by inserting the free end(s) into the opening(s) in the socket clasp. The strap(s) also have a toothed surface, and the teeth allow forward movement which makes the loop(s) smaller and tighter, but do not permit withdrawal of the strap(s) from the clasp(s).

The problem with such temporary restraints, whether single loop or double loop, is that they are very awkward to store and carry. The cuffs are a semi-rigid, substantially unbreakable material, that generally lies flat, extending from about 15 to 25 inches in length for the single cuffs and about 40 to 60 inches in length for the double cuffs. The police officer needs to have ready availability of these restraints when they need. Often such restraints are employed in crowd and/or riot situations, where a number of such restraints are required. Disposable restraints would be much more useful if the police officers could carry a number of the restraints on their person and in their cruiser.

Some manufacturers have tried to solve the bulkiness problem by making one or more "folds" or using hinges in the cuffs, thereby allowing the cuffs to be carried in a more compact manner. See for example the Monadnock EZ fold cuff, available from Monadnock Lifetime Products, Inc. of Fitzwilliam, New Hampshire, and the ASP Tri-fold cuff, available from Armament Systems & Procedures, Appleton, Wisconsin. When a cuff of this type is folded, you must pinch the cross-section of the cuff material (e.g., Nylon 66) taking strength away from it. By pinching the cross-section, the cross-section is kinked, often making the cuff more difficult to use than if it were not kinked. Hinges introduce a weak spot in the cuff, which defeats the purpose of using the cuff as a restraint. Even when folded, disposable cuffs of both the single loop and especially the double loop variety are still quite bulky and awkward to carry.

### SUMMARY OF THE INVENTION

The present invention solves the problems of the prior art disposable cuffs, of both the single loop variety and the double loop variety, by providing a method and apparatus for coiling these cuffs into a small, easy to carry, and easy to use, coiled cuff form. Other embodiments of the present invention are the coiled disposable cuffs themselves, both in the single loop form and the double loop form.

The term "coiled" as used herein, describes a wound version, preferably a tightly wound version, of the strap portion of the cuff device, wound in a clockwise and/or counterclockwise manner, to significantly reduce the size of the cuff, and to permit easy carrying of the same. In the single loop form, the socket can be wound inside the strap, or the strap can be wound leaving the socket on the outside of the coil. In the double loop form, the two straps are normally wound separately, such that the coils are gathered under the central socket member. Insertion of the strap(s) into the socket(s) during use of the disposable cuffs, thereby forming one or more loose loops, which are to be tightened during use, is specifically excluded from the definition of the term "coiled" as used herein.

In the preferred embodiments of the present invention, the coiled cuffs are prepared by rolling or coiling the free end(s) of two commercially available temporary restraints manufactured by Monadnock Lifetime Products, Inc., and currently sold under the trademarks SPARE CUFF™ and DOUBLE CUFF™ for the single loop variety and the double loop variety, respectively. These products are both manufactured from ½ inch wide, 3/32 inch thick (minimum) impact enhanced Nylon 66. These cuffs each have a 1/8 inch thick edge and a tensile strength of over 350 lbs. Once placed on a detainee's wrist(s) or ankles, the cuffs can only be removed by cutting them off. Monadnock sells a Cuff Cutter, but

other cutting devices suitable for cutting Nylon 66 (e.g., tin snips) can be used.

In accordance with the preferred method of the present invention, the cuffs are coiled into a compact mass by rolling or coiling the free end(s) of the cuff into a very tight, compact package, and securing the coil(s) with a band around the perimeter of the coil. The free end of the single loop cuff is coiled into a single coil unit. The two free ends of the double loop cuff are coiled into a two coil unit, both being held together by a single band looped around the periphery of the coil or coils. The Monadnock products are especially amenable to this coiling and banding, because the 1/8 inch thick outer edges of the cuffs provides a central depression where the band can easily be secured.

As described above, after the end(s) of the cuff have been rolled into the desired compact configuration, the coil must be stabilized by banding it with a material strong enough to hold it in place, but flexible enough to allow it to be easily removed when needed. The banding material preferably used in this invention is a small Nylon loop, which easily slips onto the coil, and which can also be easily pushed or pulled off of the coil, freeing the cuff for use. While Nylon is preferred, other types of similar material may likewise be employed.

The rolling or coiling of the free end(s) of the cuffs requires special tooling, which is described in detail below. This tooling and method of the present invention thus permit the formation of a compact disposable hand cuff, which retains the full strength of the materials used in the construction, and introduces no weak points, as are typically found in the folded or hinged cuffs of the prior art.

#### BRIEF DESCRIPTION OF THE DRAWINGS

*See Et D1*  
~~Figure 1 shows the prior art version of a preferred double loop variety of~~

~~disposable handcuff used in the present invention.~~

Figure 2 shows the preferred apparatus for coiling single loop or double loop disposable handcuffs according to the method of the present invention.

Figure 3 shows the starting position for coiling a double loop disposable handcuff in the apparatus of Figure 2.

Figure 4 shows a close-up view of the drive gears in the apparatus of Figure 2.

Figure 5 shows the end position of a coiled double loop disposable handcuff, formed in the apparatus of Figure 2.

Figure 6 shows the overwrapped and secured coiled double loop disposable handcuff, separated from the apparatus of Figure 2.

*Inv  
C3 D2  
Et D2*  
~~Figures 7A and 7B show the preferred single loop cuff of the present invention in its uncoiled form (A) and coiled form (B).~~

*Inv  
C3 D3*  
~~Figures 8A and 8B show the preferred double loop cuff of the present invention in its uncoiled form (A) and coiled form (B).~~

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

*Inv  
D1 D4*  
Figure 1 shows the prior art version of a preferred disposable double loop handcuff used in the present invention, namely the Monadnock DOUBLE CUFF™. See also, U.S. Design Patent No. 347,156, the disclosure of which is hereby incorporated herein by reference. The preferred prior art single loop handcuff used in the present invention is the Monadnock SPARE CUFF™.

Similar disposable handcuffs from other manufacturers are likewise amenable to being coiled according to the method of the present invention into a compact and easy to use form, as taught herein.

*Ins  
C3  
D5*  
Figures 2-6 best illustrate the apparatus used to coil a double loop cuff according to the method of the present invention. The same apparatus may be used for coiling a single cuff, but one end of the cuff, advantageously the socket clasp end, is either held in place by hand, or it is mounted into a holder (not shown).

*Ins  
B2  
C6  
D6*  
As described in Figures 2-6, the apparatus which is used in the coiling of the cuffs according to the method of the present invention comprises two 0.750 inch diameter mandrels which are spaced apart at a precise distance so as to allow the coils of the cuff material form, in a tight and compact manner, and in the double loop version, advantageously having the two coils be at the same time compressed together for maximum compactness.

*Ins  
B3  
D7  
E1*  
The mandrels are advantageously slotted through the center with a slot in the shape of a radius in order to hold the two sections being rolled tight to the mandrels. The two mandrels are counter rotated using drive gears, such that they move toward one another in order to coil the cuff sections tight against each other. The radius slots also assist in allowing the coiled cuff to be stripped off of the mandrels in tact and not unrolled.

*Ins  
B4*  
As best illustrated in Figures 2-4, the drive gears which move the counter rotating mandrels are advantageously powered by a motor, because of the force needed to compact the Nylon material employed in the manufacture of the cuffs. If other materials are used in the manufacture of such cuffs, hand power could be sufficient to allow the coiling.

*Ans*  
*B3 D8*  
*C8*

As shown in Figures 2 and 6, a movable plate is used, placed over the two mandrels, so that the cuff, once it has been tightly coiled and secured with a band, can be ejected from the mandrels. This may be accomplished by applying a yoke with a handle, attached to the plate, which forces the plate forward to eject the coiled and banded cuff.

Another feature of the Monadnock cuff which allows the cuff to stay together once it is rolled together and not to unroll, is the width of the cuff in combination with the high ridges on the sides cuff.

*Ans*  
*B3 D9*

~~Figures 7A and 7B show the preferred single loop cuff of the present invention in its uncoiled form (A) and coiled form (B).~~

*Ans*  
*C4 D10*

~~Figures 8A and 8B show the preferred double loop cuff of the present invention in its uncoiled form (A) and coiled form (B).~~

This method for rolling a single or double cuff to compact it for easy storage and carrying convenience has very important advantages. It does not weaken the cuff cross-sectional strength as do pinching methods. It also does not kink the cross-section, which makes it difficult to open and use. Finally, the coiling method produces a disposable cuff, in either a single loop version or a double loop version, that is much smaller in length than comparable cuffs folded or hinged. By virtue of this invention, police officers can carry any number of these disposable cuffs on their person, or in a small bag, ready for immediate use.

The present invention has been described in detail, including the preferred embodiments thereof. However, it will be appreciated that those skilled in the art, upon consideration of the present disclosure, may make modifications and/or improvements on this invention and still be within the scope and spirit of this invention as set forth in the following claims.